Paper No. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JAMES WILLIAM OTTER

Appeal No. 2004-1125
Application No. 09/923,998

ON BRIEF

Before KIMLIN, PAK, and DELMENDO, Administrative Patent Judges.

DELMENDO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 (2003) from the examiner's final rejection of claims 1 through 3, 5 through 8, and 11 through 30 (final Office action mailed May 21, 2003, paper 9) in the above-identified application. Claim 4, the only other pending claim, stands withdrawn from further consideration pursuant to 37 CFR § 1.142(b) (2003)(effective Dec. 22, 1959).

The subject matter on appeal relates to a heat exchanger component (claims 1-3, 5-8, 11, 12, 20-23, and 28), a refrigerant cycle (claims 13-17, 24-27, and 29), and a method for lowering the surface energy of a heat exchanger (claims 18, 19, and 30). According to the appellants, heat transfer in an air conditioner is improved by applying a thin coating of a "lower surface energy material" on the inner surface of the heat exchanger of the air conditioner to prevent the wetting of lubricating oil on the oxide coated inner surface. (Specification, paragraphs 1-10.) Further details of this appealed subject matter are recited in representative claims 1, 2, 5, 6, 8, 12, 13, 19, 20, 21, 24, and 28 reproduced below:

> 1. A heat exchanger component comprising:
> a plurality of flow passages; and
> a low surface energy coating on a surface of said plurality of flow passages, said low surface energy coating reducing a wettability of oil on said plurality of flow passages.
>
> 2. The heat exchanger component as recited in claim 1 wherein said low surface energy coating is formed from a solution including a low surface energy substance and a solvent.
>
> 5. The heat exchanger component as recited in claim 2 wherein said low surface energy substance is a silane.
>
> 6. The heat exchanger component as recited in claim 5 wherein said solution contains said low surface energy silane in an amount of 1-2% by weight.

8. The heat exchanger component as recited in claim 1 wherein said low surface energy coating is monomolecular.

12. The heat exchanger component as recited in claim 1 wherein said plurality of flow passages include a plurality of interstices.

13. An [sic] refrigerant cycle comprising:
a compression device to compress a refrigerant to a high pressure employing a lubricating oil;
a heat rejecting heat exchanger for cooling said refrigerant including a plurality of condensing flow passages with a monomolecular layer of a low surface energy coating on a condensing surface to prevent said lubricating oil from wetting said condensing surface of said heat rejecting heat exchanger;
an expansion device for reducing said refrigerant to a low pressure; and
a heat accepting heat exchanger for evaporating said refrigerant including a plurality of evaporating flow passages with a monomolecular layer of a low surface energy coating on an evaporating surface of said heat accepting heat exchanger to reduce a wettability of oil on prevent said lubricating oil from wetting said evaporating surface of said heat rejecting accepting heat exchanger.

18. A method for lowering the surface energy of a heat exchanger comprising the steps of coating a surface of a plurality of flow passages of said heat exchanger with a low surface energy substance in solution and reducing a wettability of oil on said plurality of flow passages.

19. The method as recited in claim 18 wherein the step of coating said plurality of flow passages includes flowing said solution through said plurality of flow passages of said heat exchanger, draining said solution from said plurality of flow passages of said heat exchanger, and drying said plurality of flow passage of said heat exchanger.

20. The heat exchanger component as recited in claim 2 wherein said low surface energy substance is

selected from the group consisting of polyetheretherketone and polysulfone.

21. The heat exchanger component as recited in claim 1 wherein a first fluid flows through said plurality of flow passages and a second fluid flows around said plurality of flow passages, and said first fluid and said second fluid exchange heat.

24. The refrigerant cycle as recited in claim 13 wherein said low surface energy substance is selected from the group consisting of polyetheretherketone and polysulfone.

28. The heat exchanger component as recited in claim 1 wherein said oil forms droplets on said low surface energy coating.

In addition to the appellant's admitted prior art, the examiner relies on the following prior art references as evidence of unpatentability:

Erwin	3,925,149	Dec. 09, 1975
Lowenstein et al. (Lowenstein)	5,992,508	Nov. 30, 1999
Ogawa et al. (Ogawa)(published EP application)	EP 0 864 622 A2	Sep. 16, 1998

The appealed claims stand rejected as follows:

I. claims 1 through 3, 7, 8, 11, 18, 28, and 30 under 35 U.S.C. § 102(b) as anticipated by Erwin (examiner's answer mailed Jan. 13, 2004, paper 15, page 3; final Office action, pages 2-3);

II. claim 19 under 35 U.S.C. § 103(a) as unpatentable over Erwin (answer, page 3; final Office action, page 6);

III. claim 20 under 35 U.S.C. § 103(a) as unpatentable over Erwin in view of Lowenstein (answer, page 3; final Office action, pages 3-4); and

IV. claims 1, 5, 6, 12 through 17, 21 through 27, and 29 under 35 U.S.C. § 103(a) as unpatentable over the appellant's admitted prior art in view of Ogawa (answer, page 3; final Office action, pages 4-6).

We affirm rejection I but reverse rejections II through IV.[1]

I. Claims 1-3, 7, 8, 11, 18, 28, & 30: 35 U.S.C. § 102(b) over Erwin

Prior to addressing the merits of the examiner's rejection, we determine the scope and meaning of certain terms that appear in appealed claim 1. Gechter v. Davidson, 116 F.3d 1454, 1457, 1460 n.3, 43 USPQ2d 1030, 1032, 1035 n.3 (Fed. Cir. 1997); In re Paulsen, 30 F.3d 1475, 1479, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994).

[1] With respect to rejection I, the appellant groups the rejected claims as follows: (1) claims 1-3, 7, 11, and 18; (2) claim 8; and (3) claims 28 and 30. (Appeal brief filed Oct. 21, 2003, paper 14, pp. 3-5.) We therefore select claims 1, 8, and 28 from each of the appellant's claim groupings and decide this appeal as to the examiner's ground of rejection on the basis of

The present specification explains (paragraphs 2, 3, and 6):

> During operation of an air conditioner or other refrigerant cycle, lubricating oil in the compressor may leak and mix with the refrigerant that circulates through the air conditioning system. As the refrigerant flows through the tubing of the evaporating and condensing heat exchangers, the lubricating oil coats and wets the inner surface of the heat exchangers.
>
> Often, the inner surface of the tubing of a heat exchanger is provided with interstices to increase the effective area for heat transfer. As the refrigerant flows through the evaporator, the lubricating oil mixed with the refrigerant is easily entrapped in the interstices of the tubing, smoothing the inner surface and reducing the effective area for heat transfer...
>
> A thin coating of a lower surface energy material in solution is applied on the inner surface of a condenser or evaporator...

From this enlightenment, we determine that the claim language "low surface energy" refers to a surface energy that is lower than the surface energy of an otherwise uncoated inner surface of the heat exchanger in which air conditioning refrigerant is present. It follows then that the phrase "reducing a wettability of oil" refers to any reduction in wettability of the oil relative to an otherwise uncoated inner surface of the heat exchanger in which air conditioning refrigerant is present.

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these claims only. See 37 CFR § 1.192(c)(7)(2003)(effective Apr. 21, 1995).

The appellant does not dispute the examiner's determination (final Office action, page 3) that Erwin describes a heat exchanger component comprising a plurality of passages, the surfaces of which are coated with a fluorocarbon. Rather, it is the appellant's principal argument that the "claimed coating reduces oil wettability" whereas "Erwin teaches a coating that increases oil wettability." (Appeal brief, pages 4-5.)

The appellant's position lacks merit.

Erwin teaches a heat exchanger for the evaporation of aqueous solutions containing dispersed or dissolved solids in which a heated immiscible liquid such as oil is used as a heat transfer liquid that makes liquid/liquid contact with either the aqueous solution or a highly dispersed mixture of the aqueous solution in oil in a combination heating and mixing chamber whereby a portion of the solution droplets are vaporized. (Column 1, lines 14-27.) As pointed out by the examiner, Erwin teaches coating the surfaces exposed to the aqueous solution with a fluorocarbon, which the appellant describes as a preferred material for the "low surface energy coating." (Erwin's column 1, line 14 to column 2, line 18; present specification, paragraph 22 and appealed claim 7.)

Because the coatings described in the appellant's specification and Erwin are identical, the prior art coating

must inherently or necessarily possess the same characteristics recited in appealed claim 1. In re Schreiber, 128 F.3d 1473, 1478, 44 USPQ2d 1429, 1432 (Fed. Cir. 1997); In re Spada, 911 F.2d 705, 708, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

We are not persuaded by the appellant's erroneous argument that, unlike the recited coating, Erwin's coating increases oil wettability. Erwin actually teaches that the fluorocarbon is "preferentially oil wettable" relative to the aqueous solution. (Column 1, line 68 to column 2, line 5.) This is not inconsistent with the characteristic or function of the coating recited in appealed claim 1, which characteristic or function does not involve the presence of an aqueous environment but an air conditioning refrigerant instead.

We also reject the appellant's untenable argument (reply brief filed Mar. 31, 2004, paper 17, pages 1-2) that only appealed dependent claim 7, and not independent claim 1, specifies fluorocarbon as one of the recited low surface energy coating substances. This argument appears to be based on a complete misunderstanding of the relationship between an independent claim and a dependent claim. Because a dependent claim must further limit an independent claim,[2] an independent

[2] See 37 CFR § 1.75(c)(2003)(effective Oct. 1, 1982).

claim will necessarily encompass the subject matter of a dependent claim.

As to separately argued claim 8, the appellant argues that Erwin does not disclose that the fluorocarbon coating is "monomolecular." (Appeal brief, page 5.) This argument is not persuasive, because the appellant proffers no objective evidence to establish that a "monomolecular" coating, as described in the specification in paragraph 19, is any different in terms of structure from Erwin's coating having a thickness of 0.5 mil to 2 mils. In re Thorpe, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985); In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977).

As to separately argued claim 28, the appellant urges that Erwin does not disclose oil droplets on the surfaces of the flow passages. (Appeal brief, page 5.) The appealed claim, however, is directed to a heat exchanger component that does not positively recite oil as part of the heat exchanger component. Because Erwin's heat exchanger and the appellant's heat exchanger component are structurally identical, oil droplets would necessarily form in Erwin's heat exchanger when it is subjected to the same conditions described in the present specification.

For these reasons, we uphold the examiner's rejection on this ground.

II. Claim 19: 35 U.S.C. § 103(a) over Erwin

Regarding claim 19, the examiner admits that the recited coating steps are not disclosed in Erwin. (Final Office action, page 6.) Nevertheless, the examiner held (id.):

> It would have been obvious to a person of ordinary skill in the art at the time the invention was made to perform the coating process that includes flowing the solution through the passages, draining the solution, and drying the passages, since applicant has not disclosed that performing such process solves any stated problem or is for any particular purpose and it appears that the passages in the heat exchanger would perform equally well with a coating process that includes heat bonding as described by Erwin. Furthermore, the coating process involving the flowing, draining, and drying is a well known process in the art dealing with applying a thin layer of coating inside a tube.

We cannot agree with the examiner on this issue. The examiner does not point to any specific motivation, suggestion, or teaching in the prior art that would have led one of ordinary skill in the art to modify Erwin. In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999); In re Warner, 397 F.2d 1011, 1016, 154 USPQ 173, 177 (CCPA 1967).

For this reason, we cannot uphold this ground of rejection.

III. Claim 20: 35 U.S.C. § 103(a) over Erwin in View of Lowenstein

The examiner's basic position is that Lowenstein teaches polyetheretherketone as a coating on the surface of heat exchangers and that its use in Erwin would have been obvious to one of ordinary skill in the art. (Final Office action, page 4.)

We disagree. Nothing in Lowenstein suggests that polyetheretherketone and fluorocarbon would be interchangeable for the purpose described in Erwin.

Accordingly, we cannot affirm.

IV. Claims 1, 5, 6, 12-17, 21-27, & 29: 35 U.S.C. § 103(a) over the Admitted Prior Art in View of Ogawa

The examiner admits that the admitted prior art does not disclose a heat exchanger component having the recited coating but that Ogawa provides the motivation to apply a monomolecular coating on the heat exchanger surfaces of the admitted prior art "in order to provide a longer lasting device through the strong adhesion to the substrate so that the cost of maintenance is reduced." (Final Office action, page 5.)

Again, we cannot agree with the examiner. Nothing in Ogawa suggests the desirability of applying the here recited coating

on the surfaces of a plurality of flow passages of a heat exchanger.

For this reason, we cannot affirm this ground of rejection.

Summary

In summary, we affirm the examiner's rejection under 35 U.S.C. § 102(b) of appealed claims 1 through 3, 7, 8, 11, 18, 28, and 30 as anticipated by Erwin. We reverse, however, the rejections under 35 U.S.C. § 103(a) of: claim 19 as unpatentable over Erwin; claim 20 as unpatentable over Erwin in view of Lowenstein; and claims 1, 5, 6, 12 through 17, 21 through 27, and 29 as unpatentable over the appellant's admitted prior art in view of Ogawa.

The decision of the examiner is therefore affirmed in part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED IN PART

Edward C. Kimlin Administrative Patent Judge	)	
Chung K. Pak Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
Romulo H. Delmendo Administrative Patent Judge	)	

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